Navigation Planning in a Constrained Budget Environment

Presented to

he Planning Community of Practice Conferenc

Collaboration for Integrated Water Resources Management

9 May 2006 **San Francisco, California**

David Grier

Institute for Water Resources

&

Mark Hammond

Huntington District

U.S. Harbors and Waterways: Vital to Trade ...and to Our National Economy

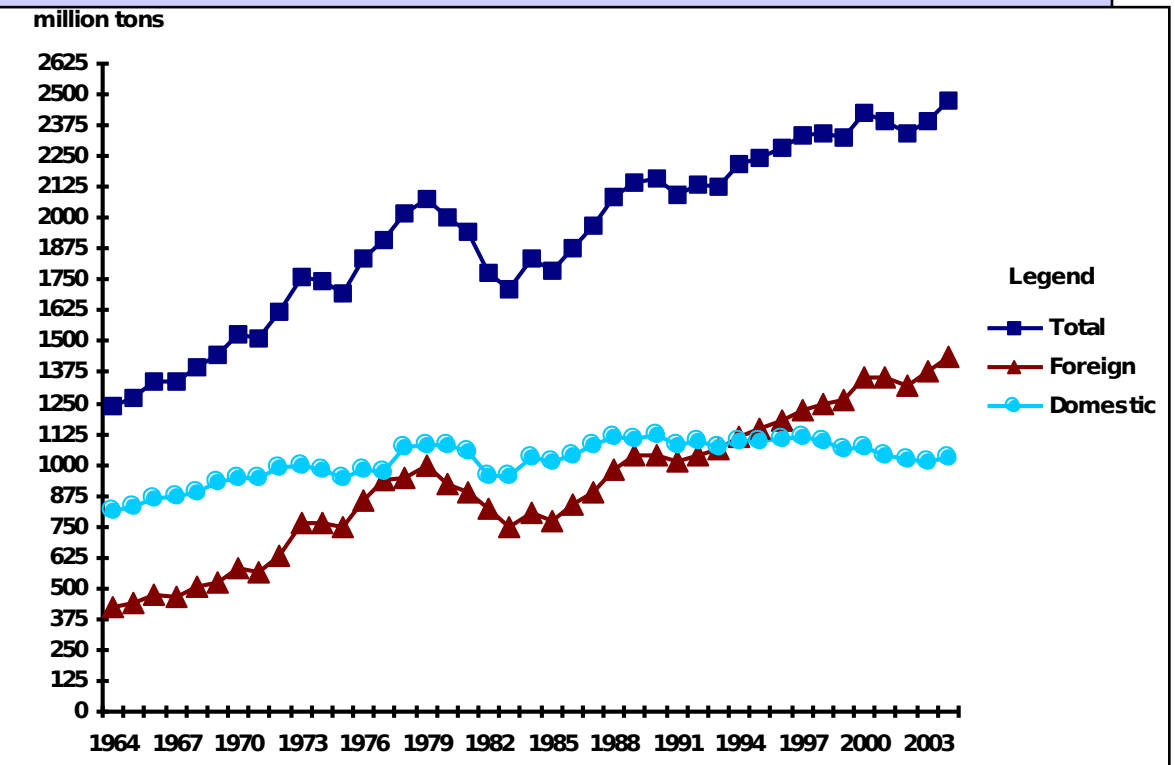
Fuel-Taxed Inland Waterway System

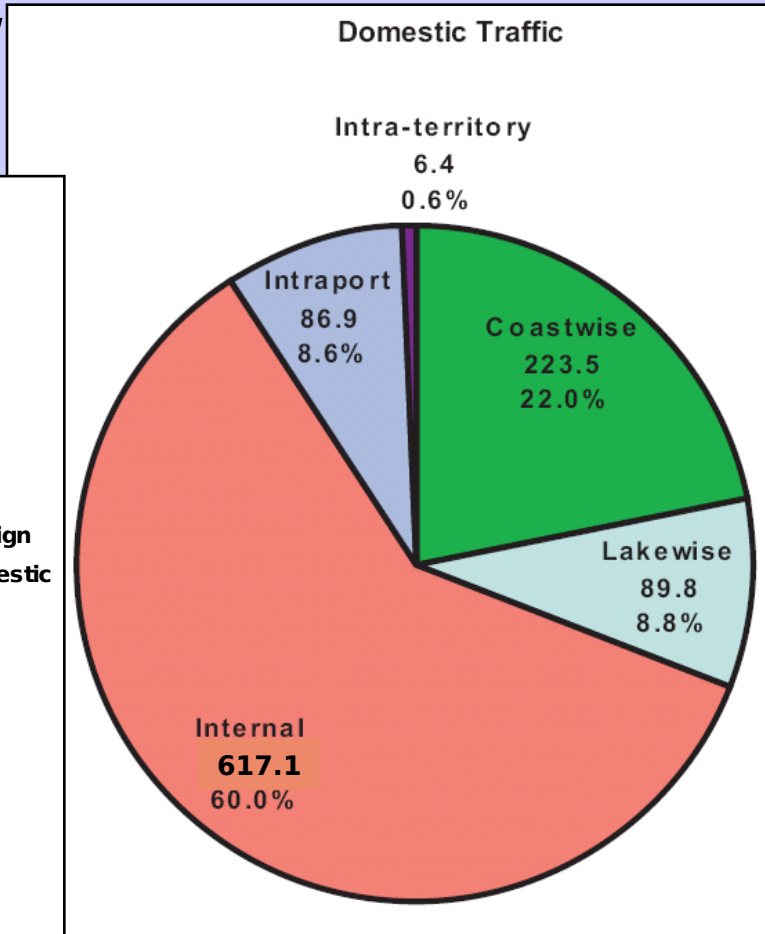
- **Nearly 11,000 Miles 9 ft & Over**
- **192 Lock Sites / 238 Chambers**
- **Moving Over 600 Million Tons**
- **About 2/3rds Cost of Rail and 1/10 Cost of Truck**
- **Replacement Cost $125+ Billion**

U.S. Waterborne Commerce

by Type of Traffic

- 2.5 Billion Tons (2004)
- 58% Foreign Trade / 42% Domestic
- Of Domestic: 60% Inland Waterw





Challenge: Aging Water Resources Infrastructure

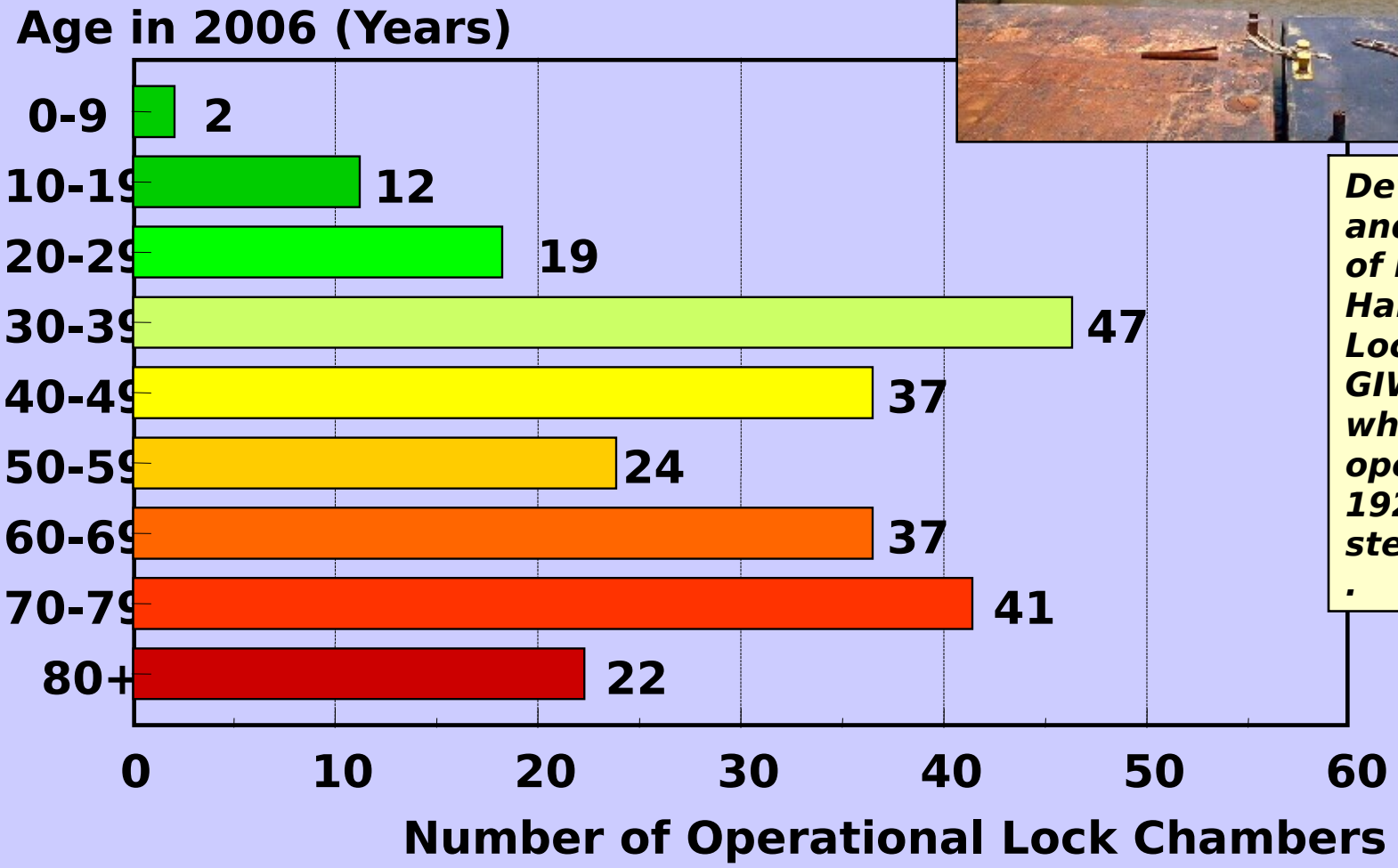
- Half of locks more than 50 years old
- Investments in water resources infrastructure have declined in real terms
- Result: more frequent closures for repairs, decreased performance and

Leaking spare miter gates, Upper Miss Lock 19

Crumbling lock wall, Lower Mon 3, opened in 1907

Concrete deterioration at Chickamauga could result in lock

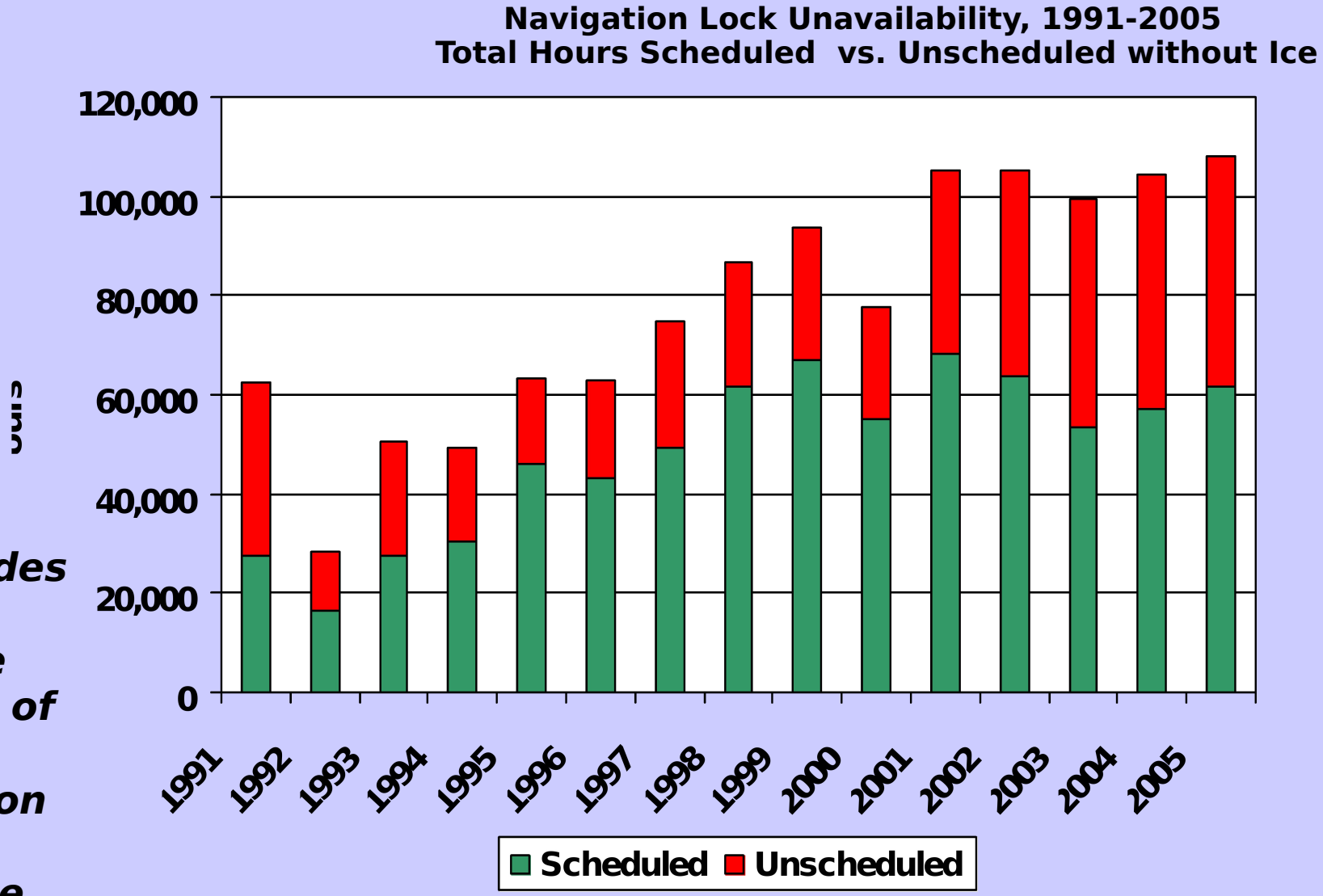
Challenge: Aging Lock Inventory*



Dewatering and repairs of Inner Harbor Lock, GIWW, which opened in 1923 for steamboats .

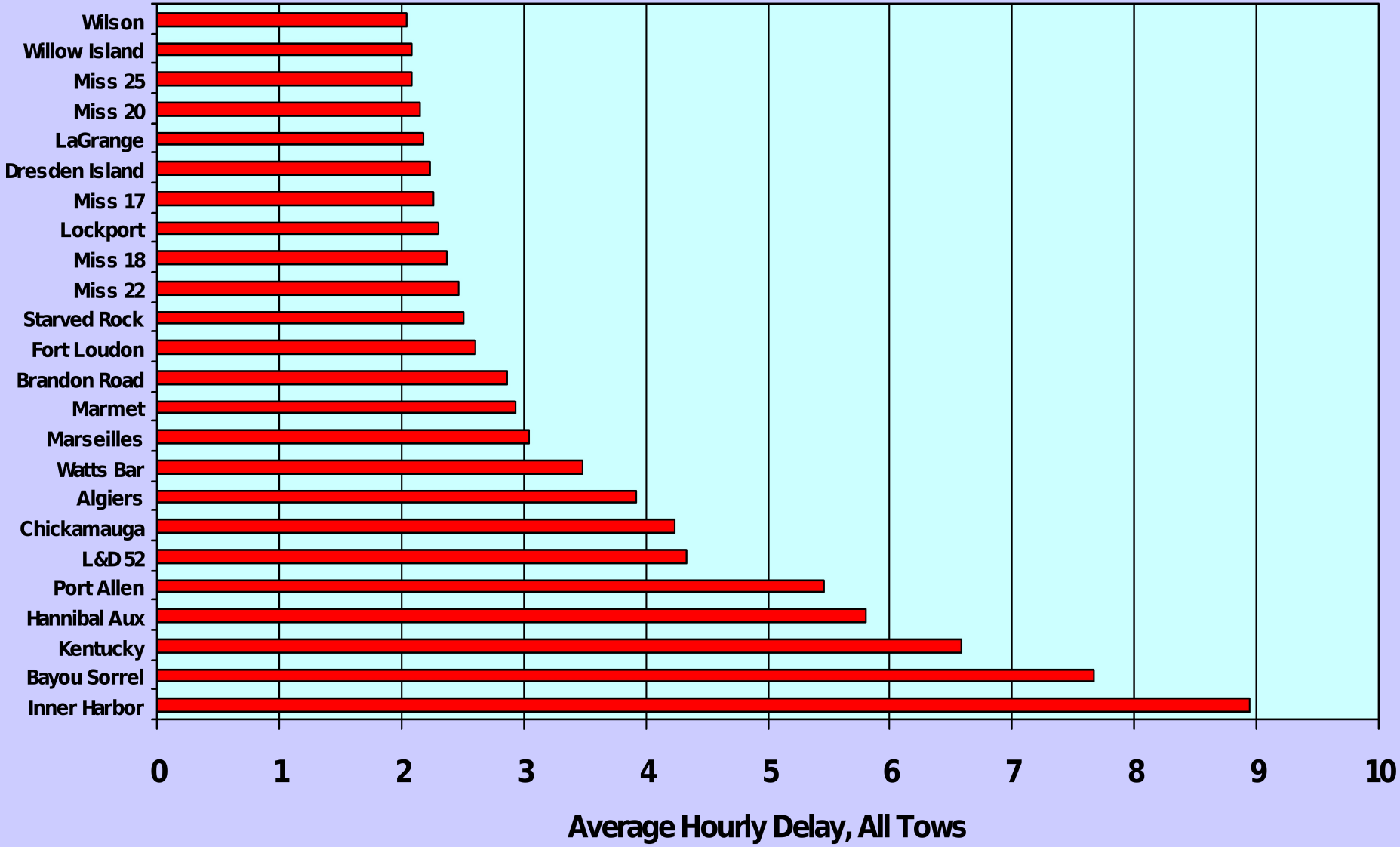
*Includes all operational deep and shallow draft Corps and TVA navigation locks.

Challenge: Aging Infrastructure + O&M Backlog = Increasing "Downtime" at Locks

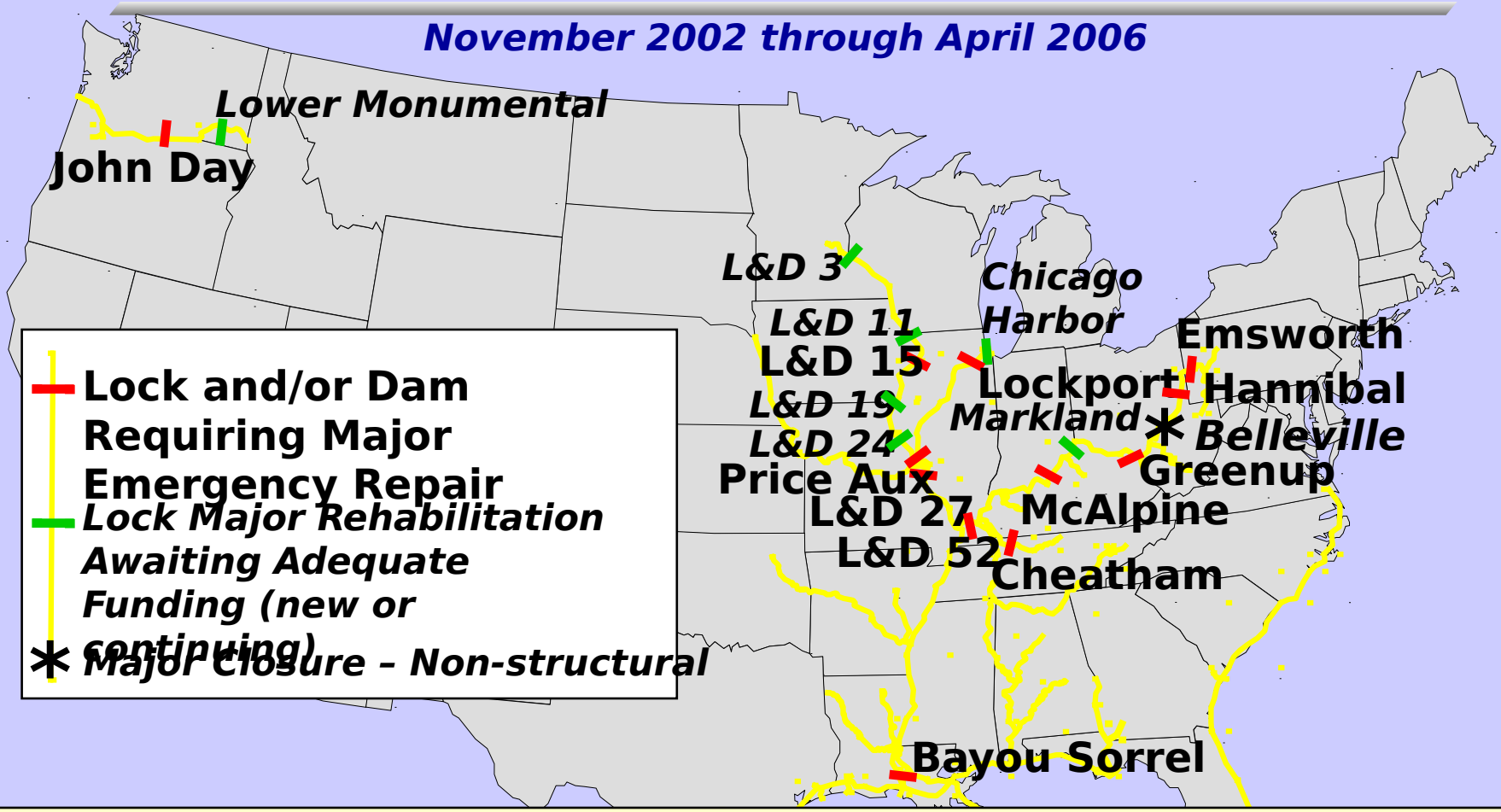


This erodes the effective capacity of the navigation system over time

Average Hourly Delays by Lock
All Tows, 2005

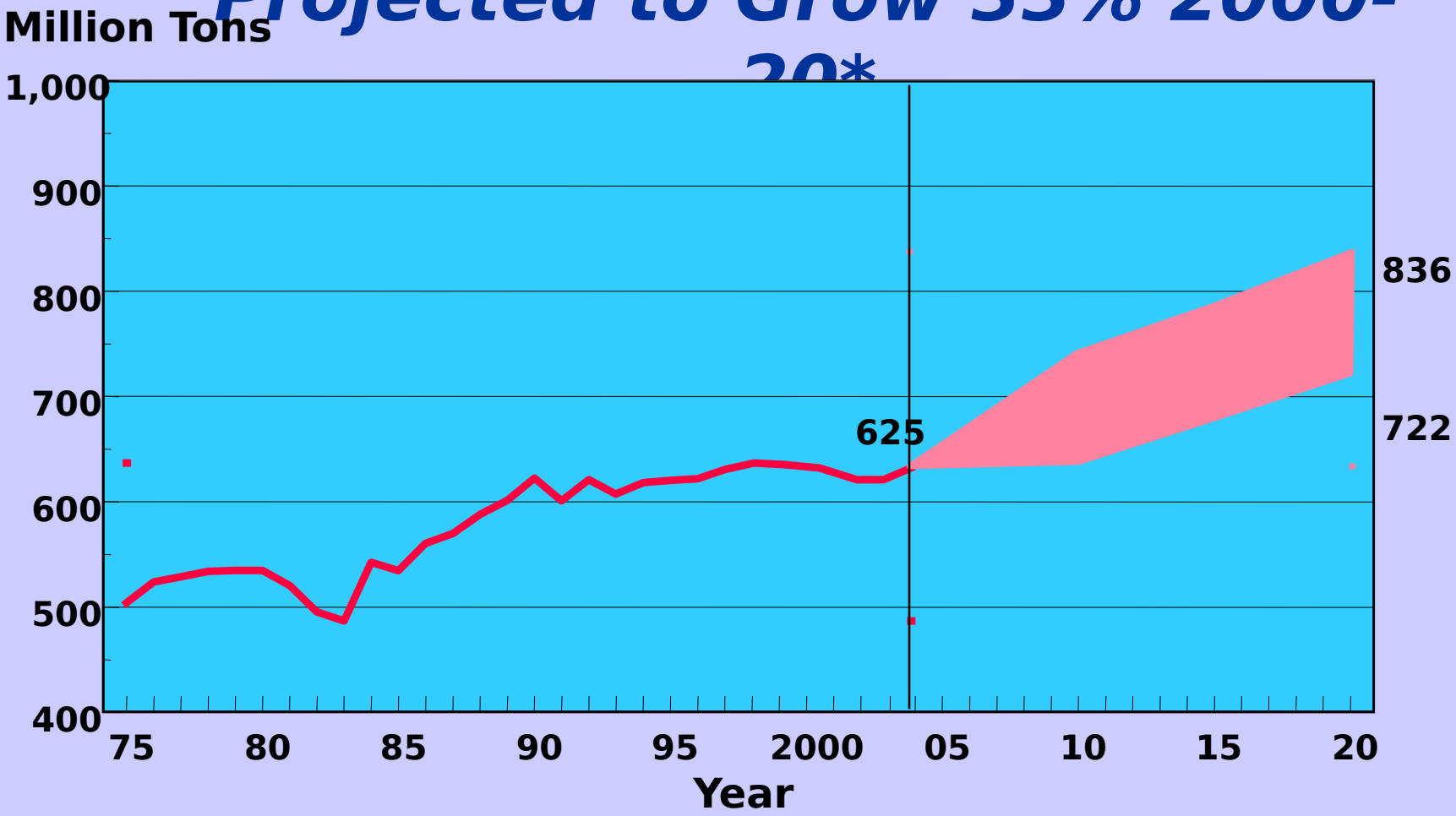


Major Locks and Dams Requiring Emergency Repairs



Tight funding means maintenance and repair on a "fix-as-fail
Meanwhile the list of major rehabilitations waiting for funding

Challenge: Inland Waterway Traffic Projected to Grow 33% 2000-20*



*Assumes “Unconstrained” Growth

Working to Meet the Challenge: Major Navigation Projects Underway

As of April 2006

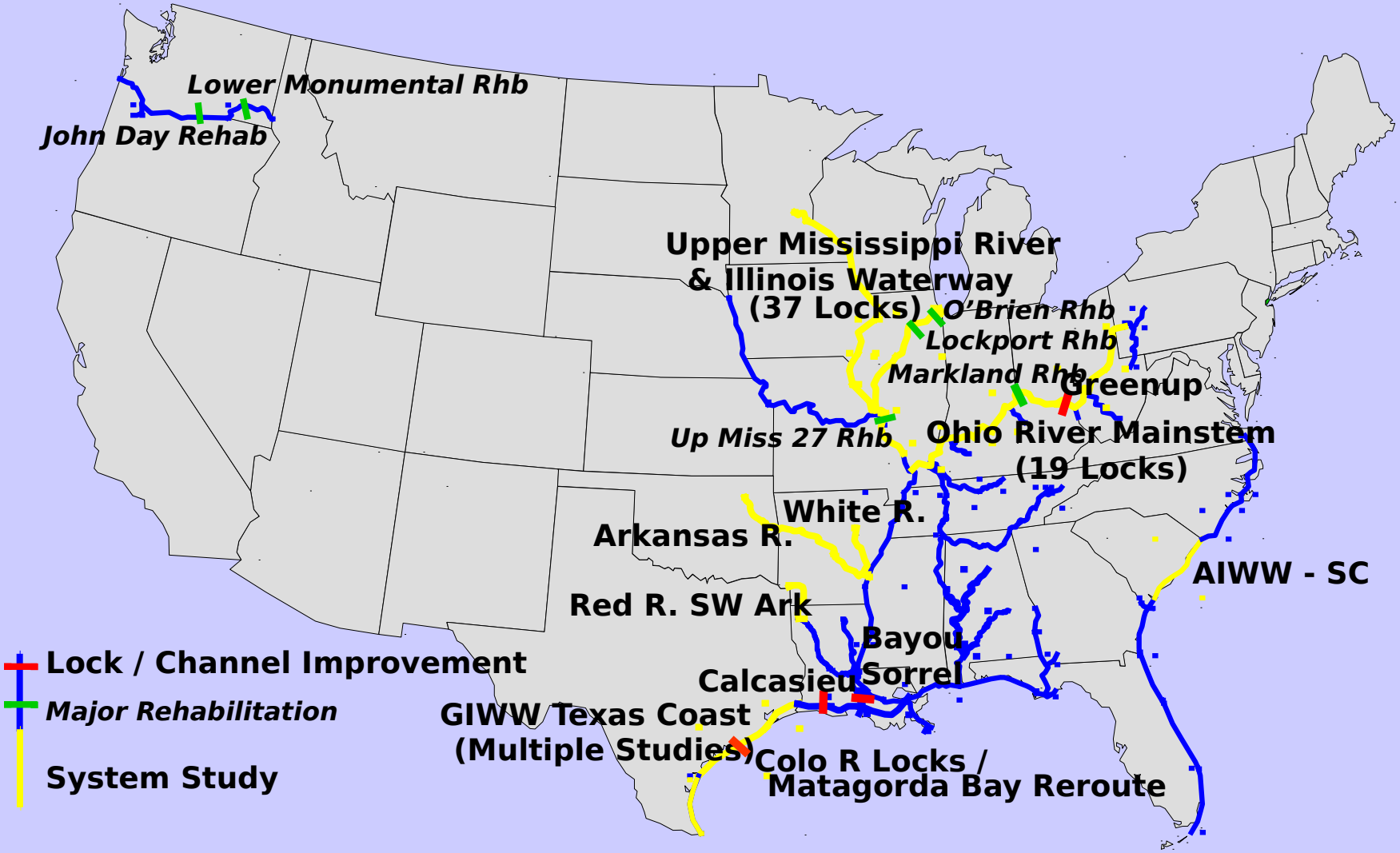
Active new lock construction and major rehabilitation program underway in FY '06:

- **9 new or replacement locks**
- **5 major rehabs**
- **$368 million in funding**
- **Total investment underway of $5.8 billion**

Major Inland Navigation Studies

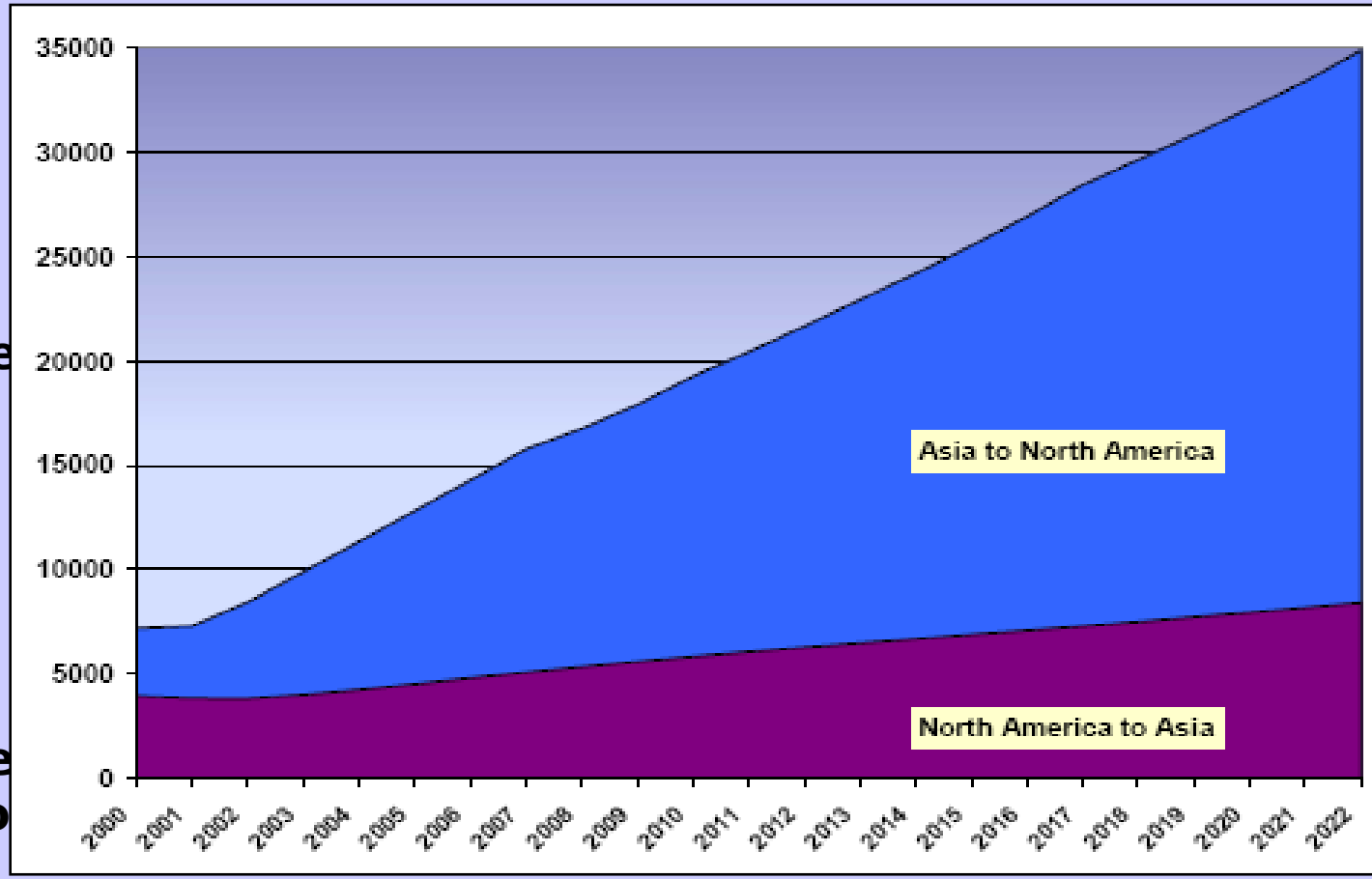
Potentially Leading to Projects Cost-Shared from IWTF

April 2006



Future of North American Container Trade with Asia - *(Thousands of TEUs)*

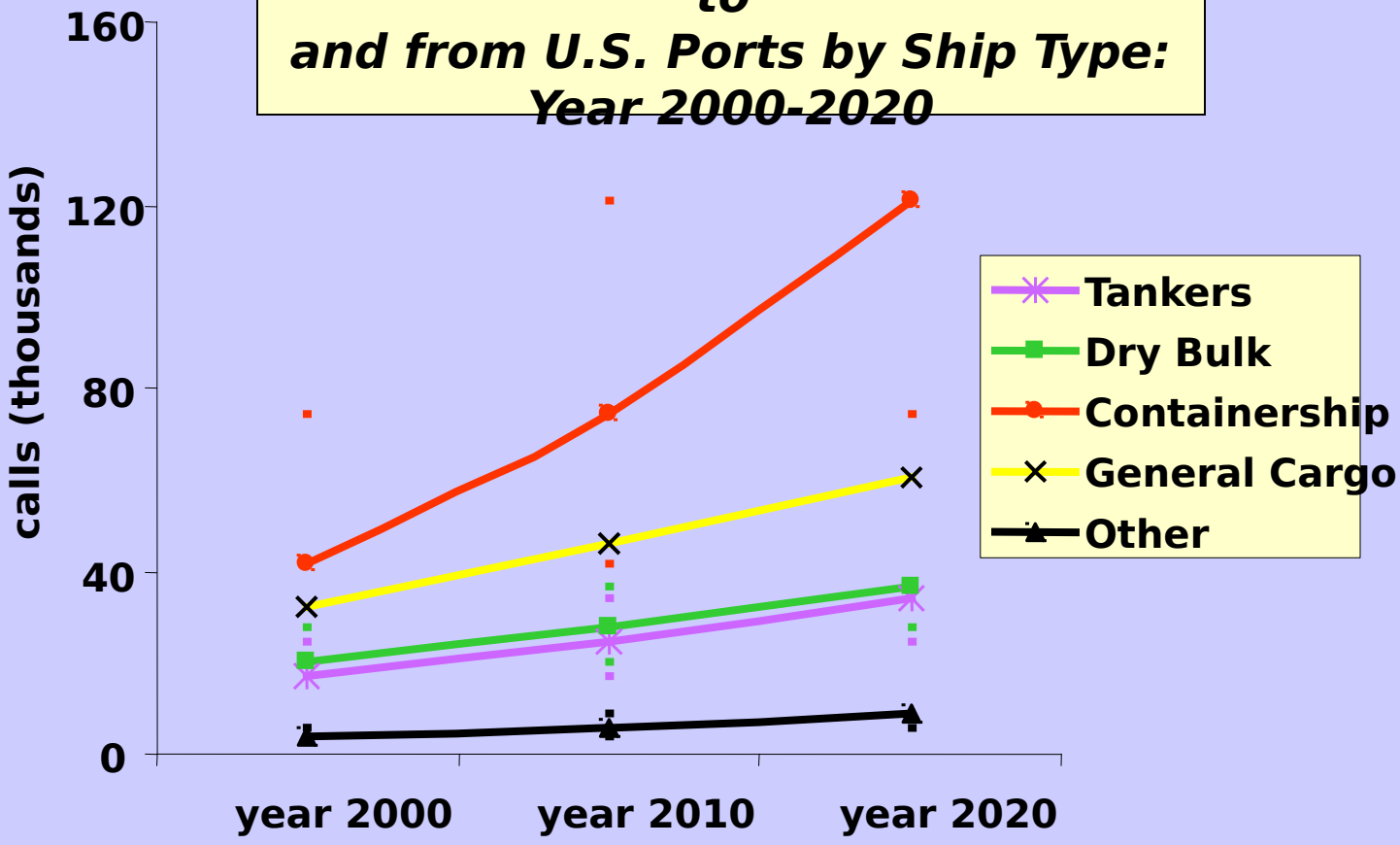
- **Asia-North America eastbound flows hit 5.4 million TEU in '04**
- **Driven by trade from China to U.S. West Coast**
- **May reach 28 million TEU by 2022**
- **Huge challenge to U.S. ports to handle this volume**



Source: Global Insight, Jan

The Future Challenge: They are Steaming to Our Shores to Stock Our Stores…

Projected Number of Annual Calls to and from U.S. Ports by Ship Type: Year 2000-2020



Source: National Dredging Needs Study, US

Deep Draft Challenges: Mega-ships

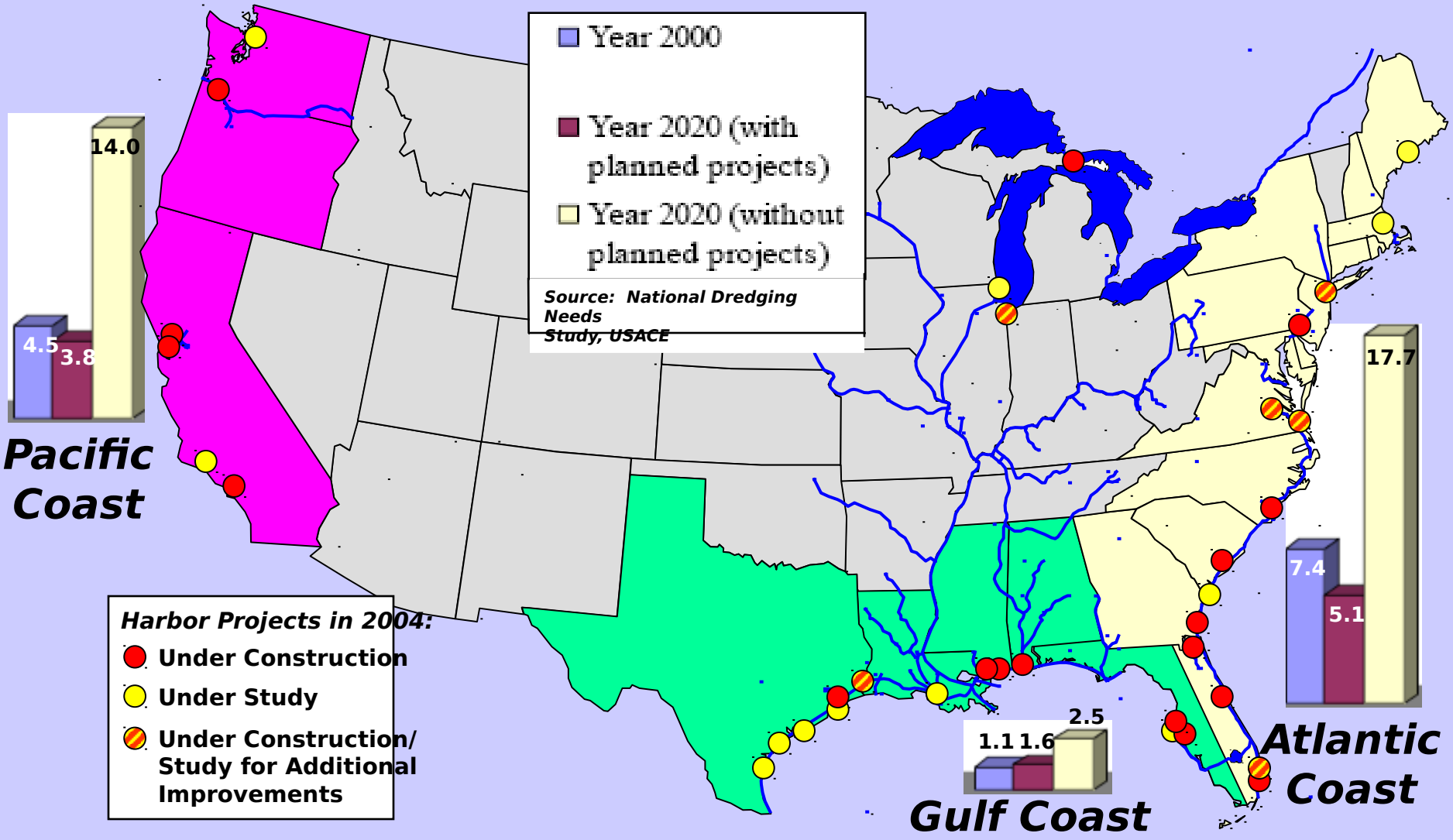
OOCL's "Shenzhen" - 8,000+ TEUs

- Capacity 8,063 TEUs
- 6 in service, 6 more on order

- Length 322 m (1,056 ft) - *11 m shorter than Nimitz-class aircraft carrier)*
- Width 42.7 m (140 feet) - *wide enough to cover 11 freeway lanes)*
- Height of a 15-story building
- Loaded draft 14.5 m (47.7 feet)

Depth-Constrained Containership Calls in 2020, with and without Planned Harbor Projects

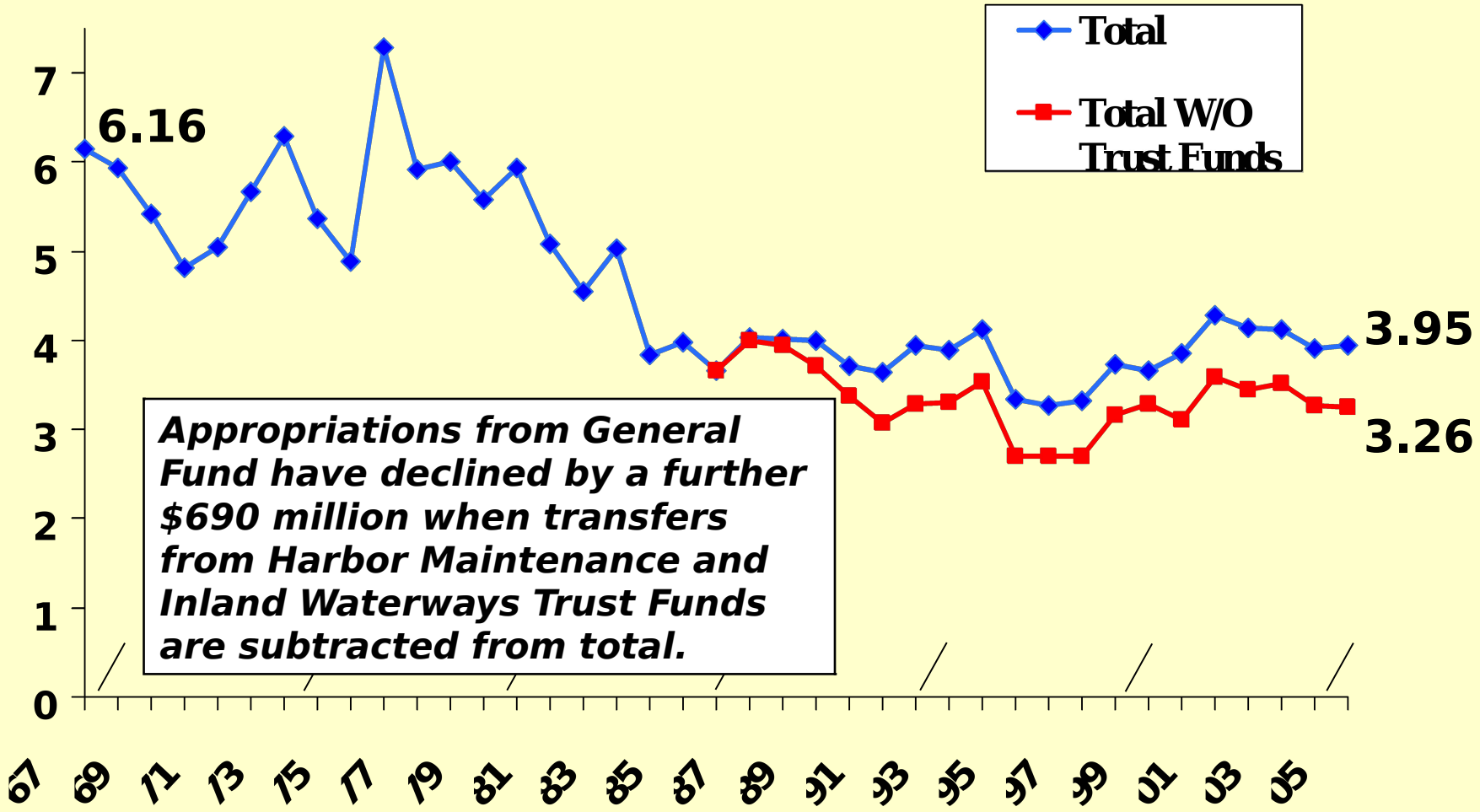
(in thousands of ship calls)



Meeting the Challenge: Key Harbor Improvement Projects Funded in 06

Civil Works Appropriations

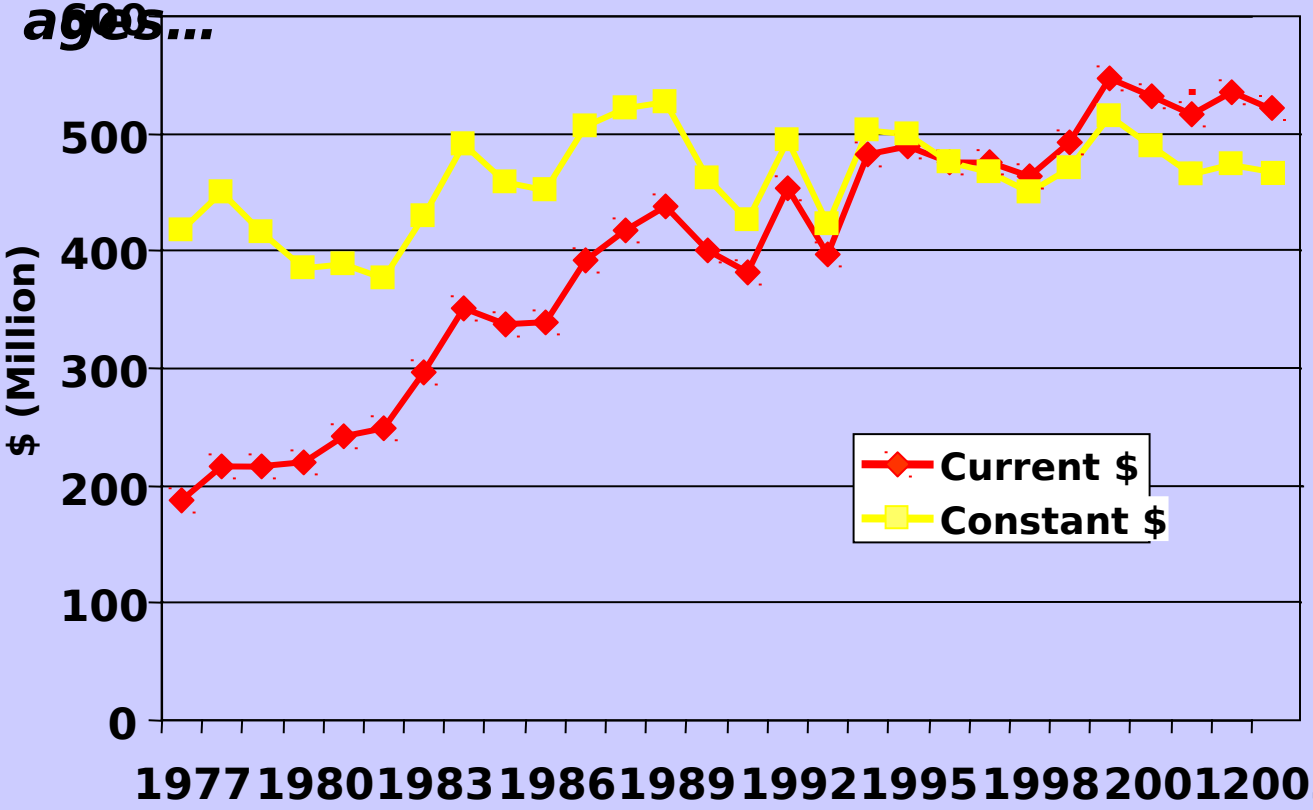
Constant (FY 96) $ Bn – Less Trust Funds



Challenge: Inland Waterway O&M Trends

1977-2004 Current $ and 1996 Constant $ *

Challenge: Flat O&M funding in constant dollars, even as project portfolio grows and ages…



Lock wall, Lower Mon

Lock wall deterioration, Chickamaug

* Fuel-Taxed Waterways Only

Funding Sources for Corps Navigation Expenditures

Harbors

O&M	Federal Government	0%
Harbor Maintenance TF		100%
Construction	Federal Government	40-80%
Project Sponsors		20-60%

Inland Waterways

O&M	Federal Government	100%
Construction	Federal Government	50%
Inland Waterways TF		50%

Inland Waterways Trust Fund

Current Status: End FY 2005

- **Starting 05 Balance: $ 372.1 Million**
- **Revenues: $ 91.3 Million**
- **Interest: $ 7.7 Million**
- **Outlays: $ 136.3 Million**
- **Ending 05 Balance: $ 334.7 Million**
- **Projected Outlays FY 06: $ 167 Million**
- **Projected Ending 06 Balance: $ 268 Million**

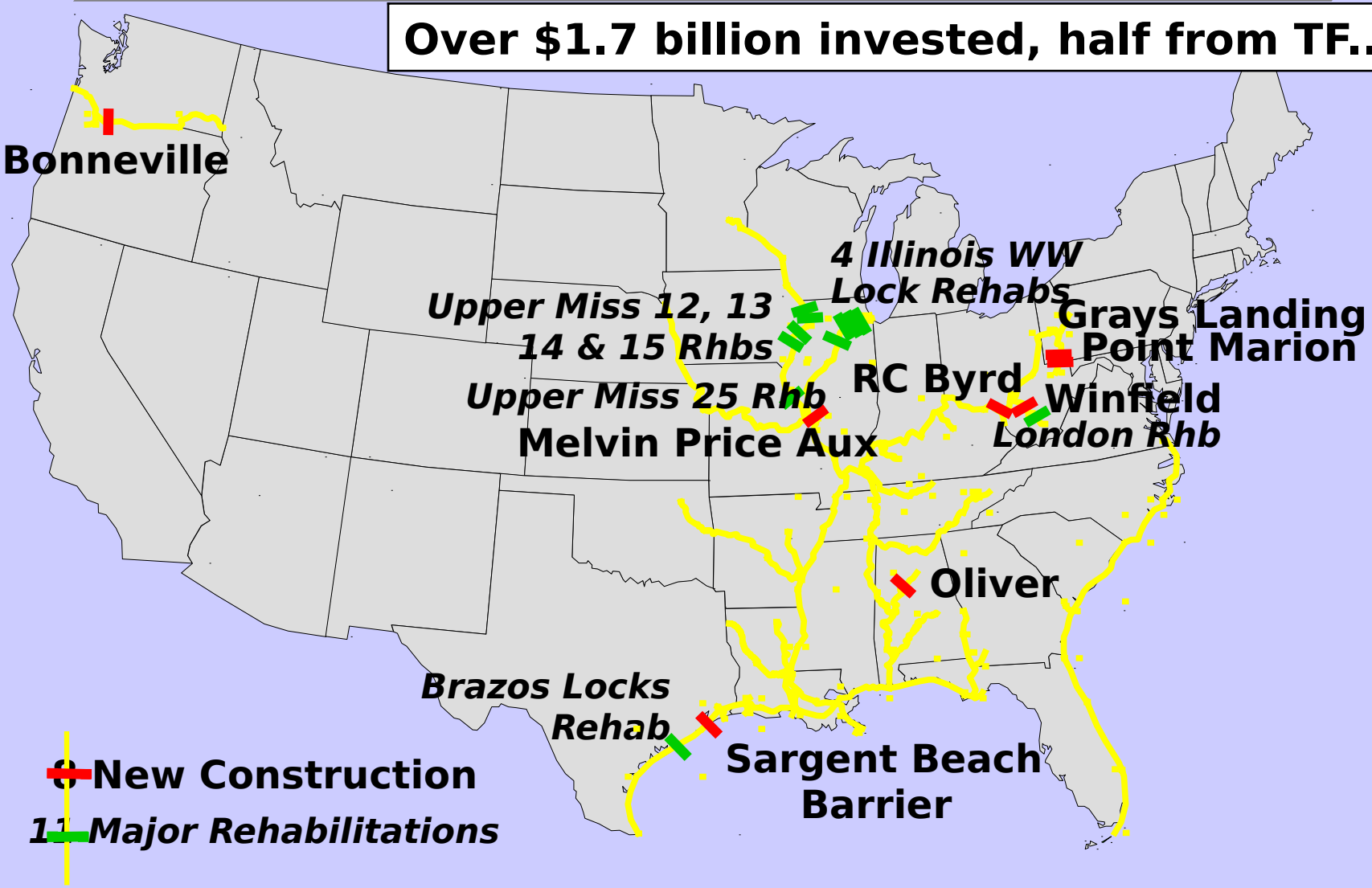
(Based on FY 06 Allocations)

Major Navigation Projects Operational

Cost-Shared with Trust Fund

Through April 2006

Over $1.7 billion invested, half from TF...

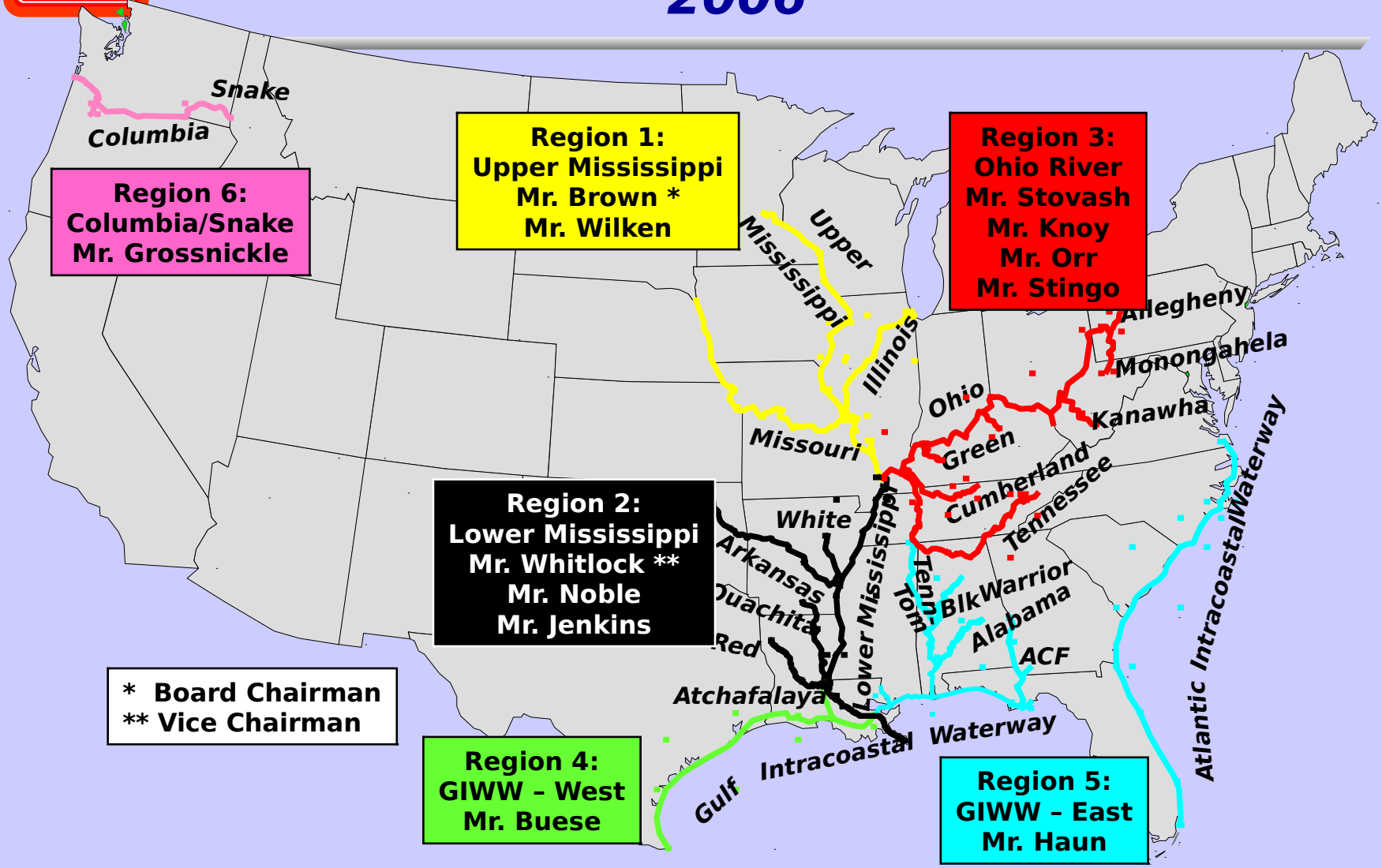


Inland Waterways Users Board

http://www.iwr.usace.army.mil/newusersboard/

- Advisory Board Created by WRDA ’86
- Advise Sec Army, Congress on Investment Priorities for IWTF
  - Meet 2-3 times annually
  - Annual Report to Congress timed to budget cycle
- Eleven Members Appointed by Sec Army
  - Waterway carriers and shippers
  - 2-year terms
  - Can be reappointed, max 4 consecutive years
- 4 Federal Observers incl ASA(CW)
- DCW Serves as Ex Director

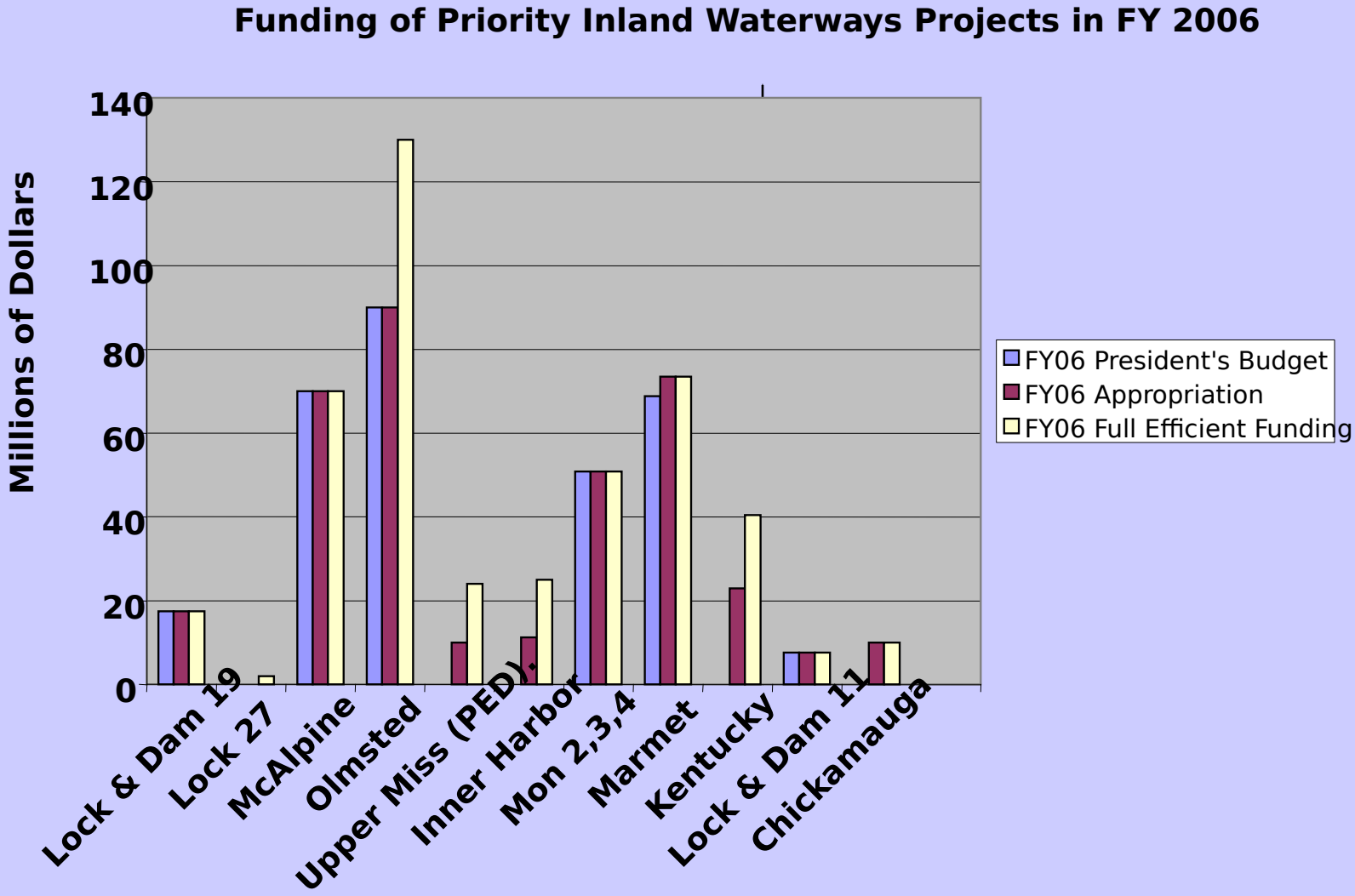
Inland Waterways Users Board
2006



IWUB Annual Report 2006

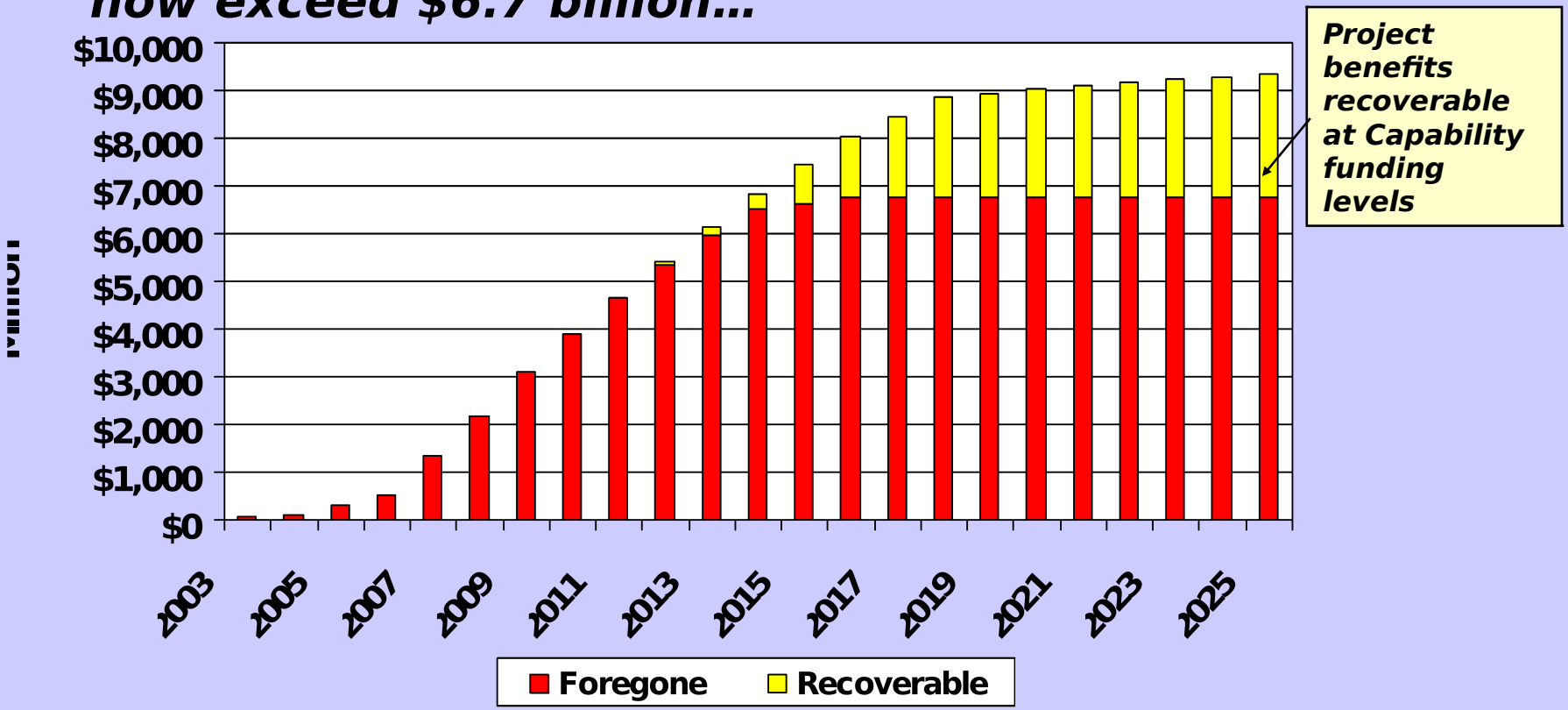
"The Inland Waterways Users Board is extremely concerned and again reports to you that this invaluable system is exhibiting signs of serious neglect. Delays and slippage in completion schedules of a number of Inland Waterways Trust Fund-financed projects have compounded the maintenance budget crisis as aging facilities, in the process of being replaced, are forced to remain in service for extended periods. In 2005 the American Society of Civil Engineers gave the inland navigation system a near failing grade of D minus. Over the past 10 years the Board has witnessed a 110% increase in unscheduled lock outage hours, while at the same time the maintenance backlog for navigation facilities has grown to over $600 million. Because of this continuing deterioration in navigation infrastructure, shippers are questioning the reliability and viability of barge transportation on the in
this situation of unfunded lock

Funding for Lock & Dam Construction Cost-Shared with IWTF

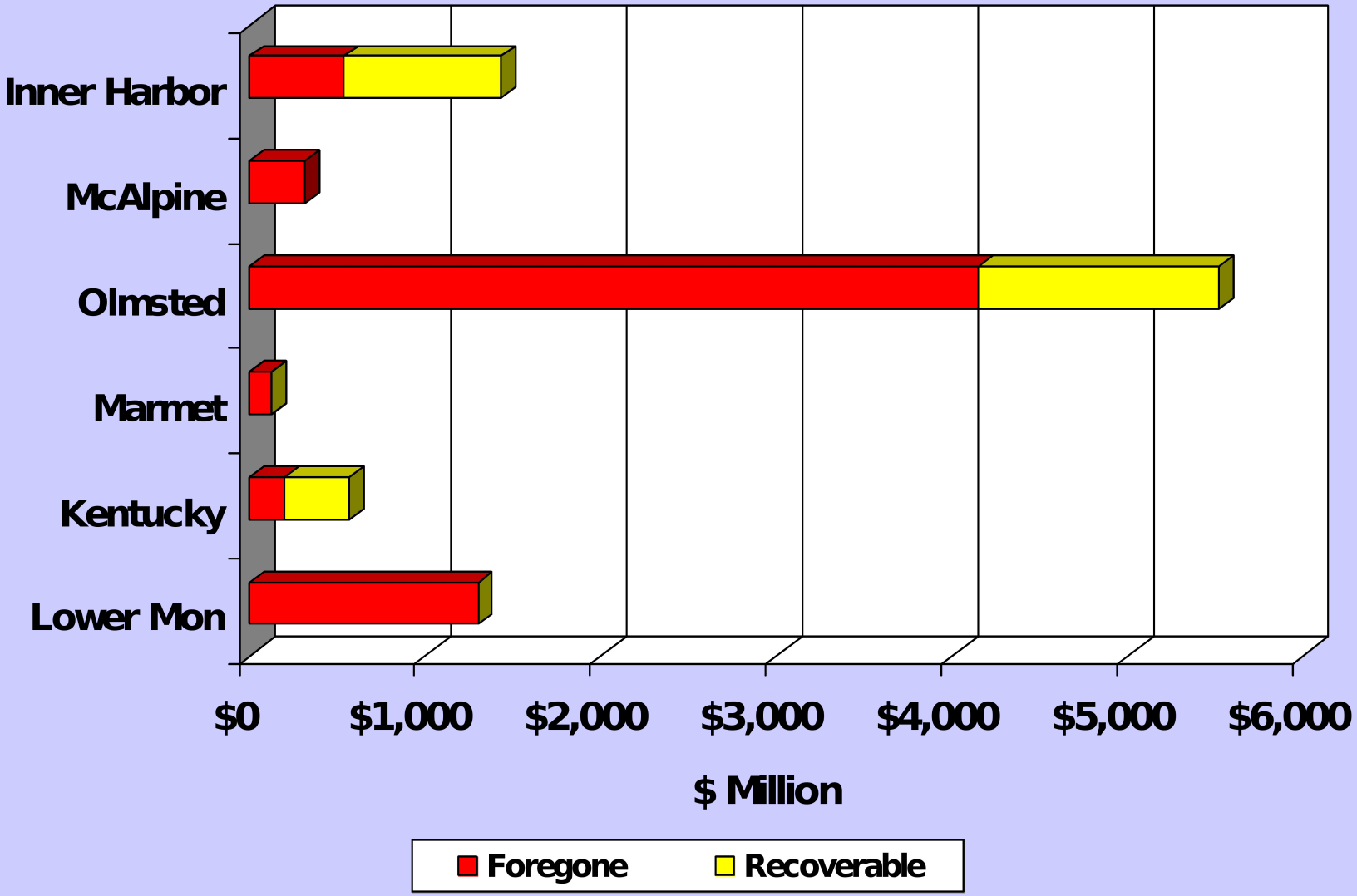


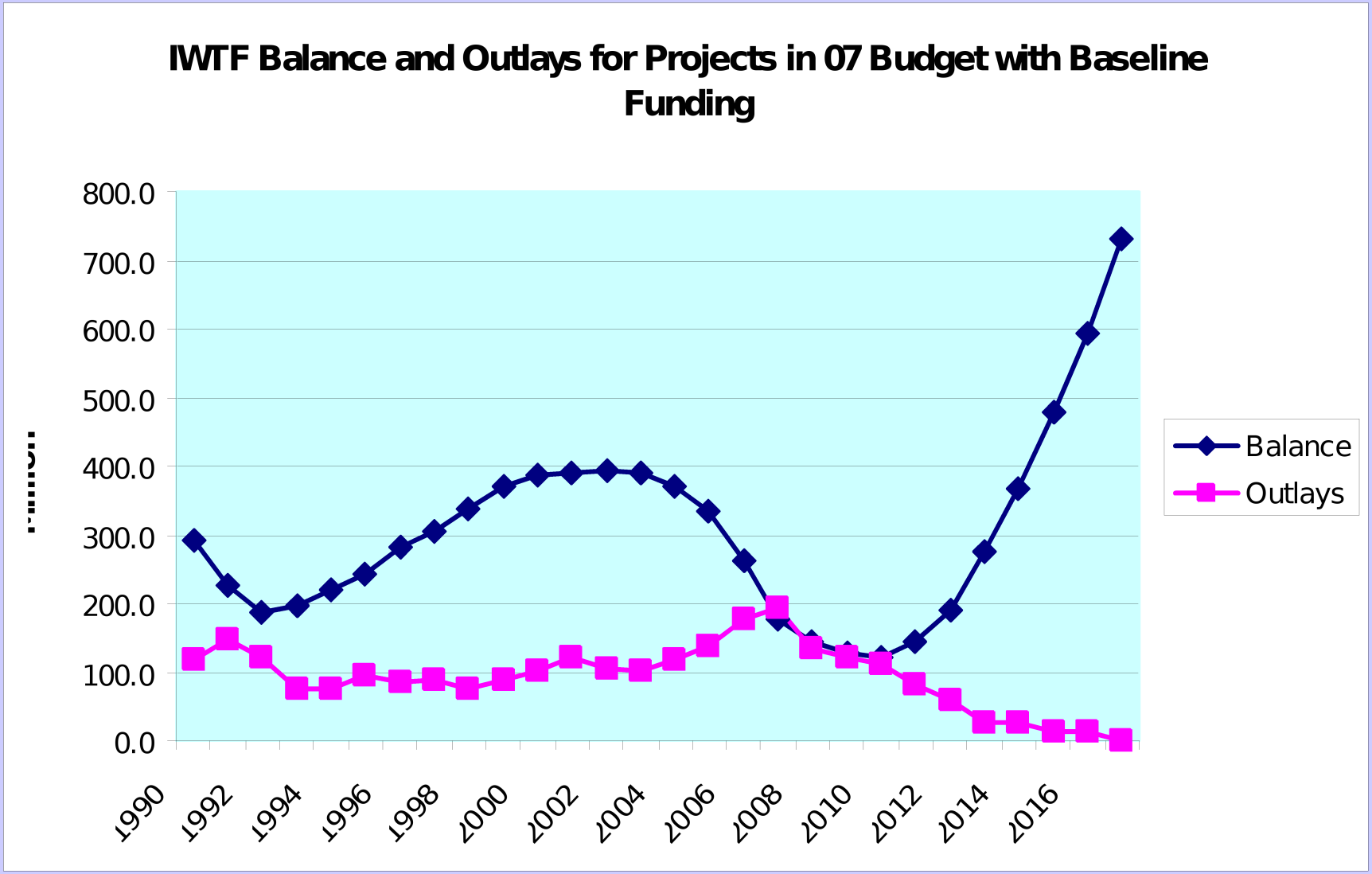
Cumulative Economic Benefits Foregone from Construction Delays

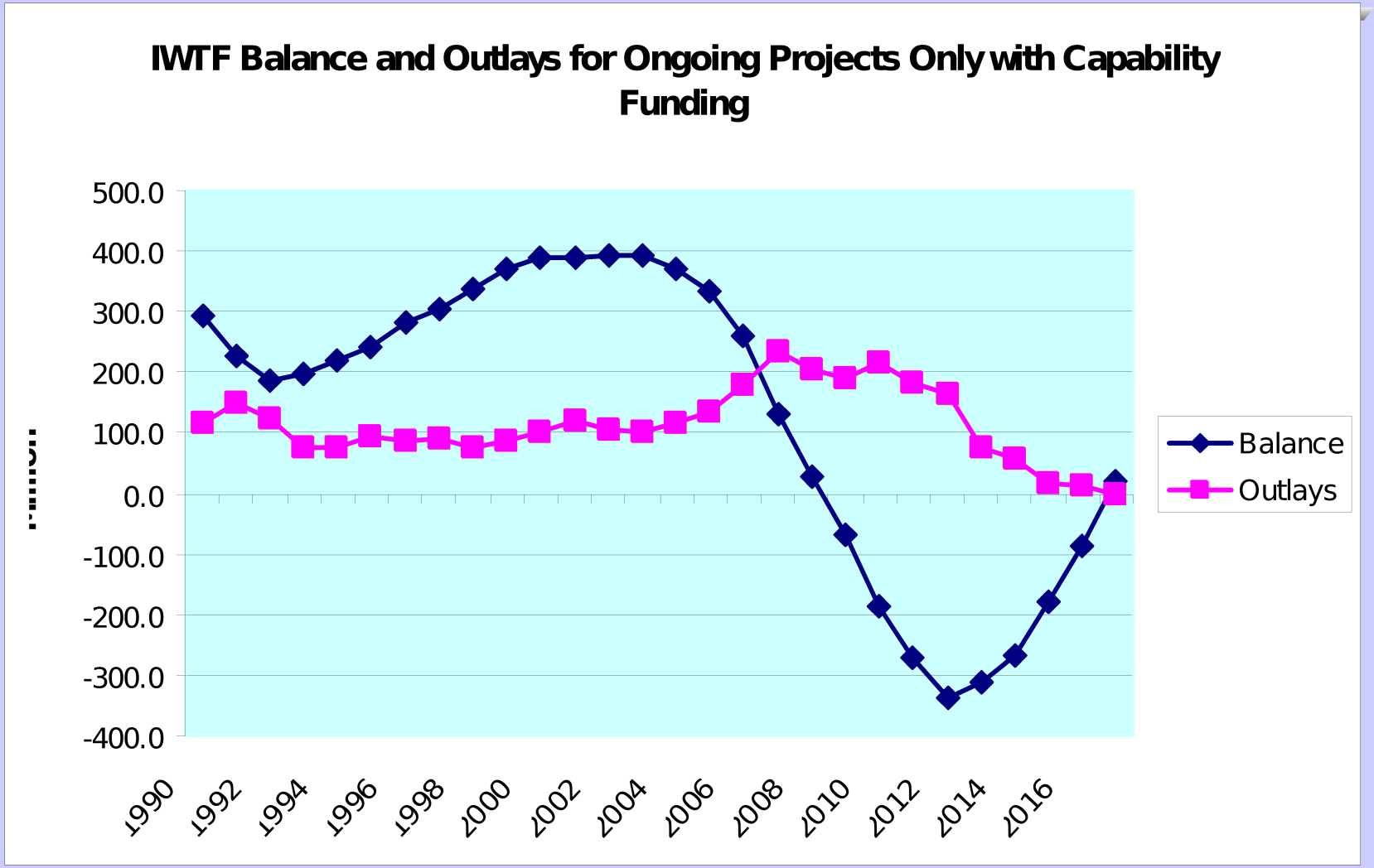
Constrained funding has led to delays in project completions, foregoing anticipated project benefits. Cumulative benefits that can no longer be recovered now exceed $6.7 billion…

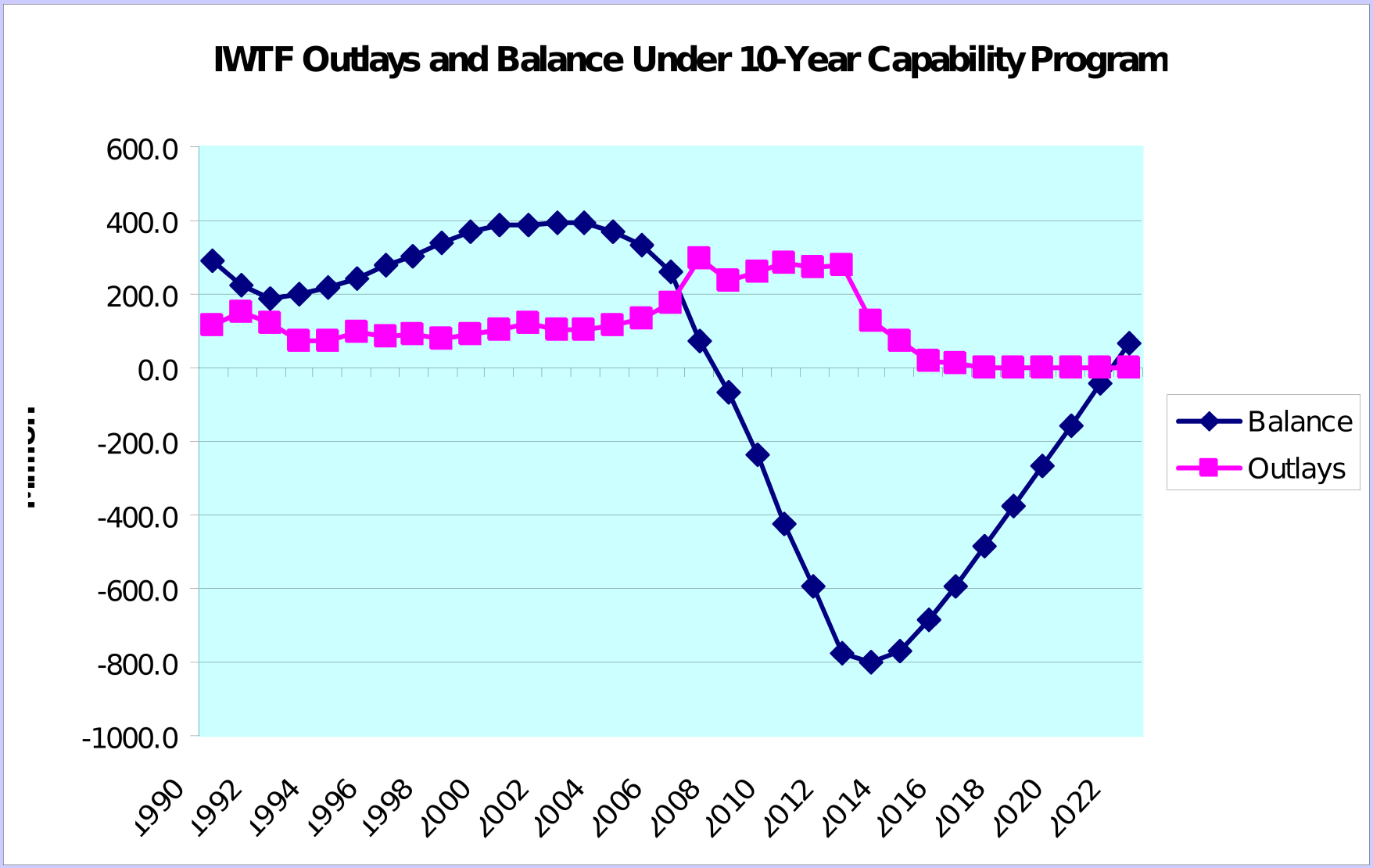


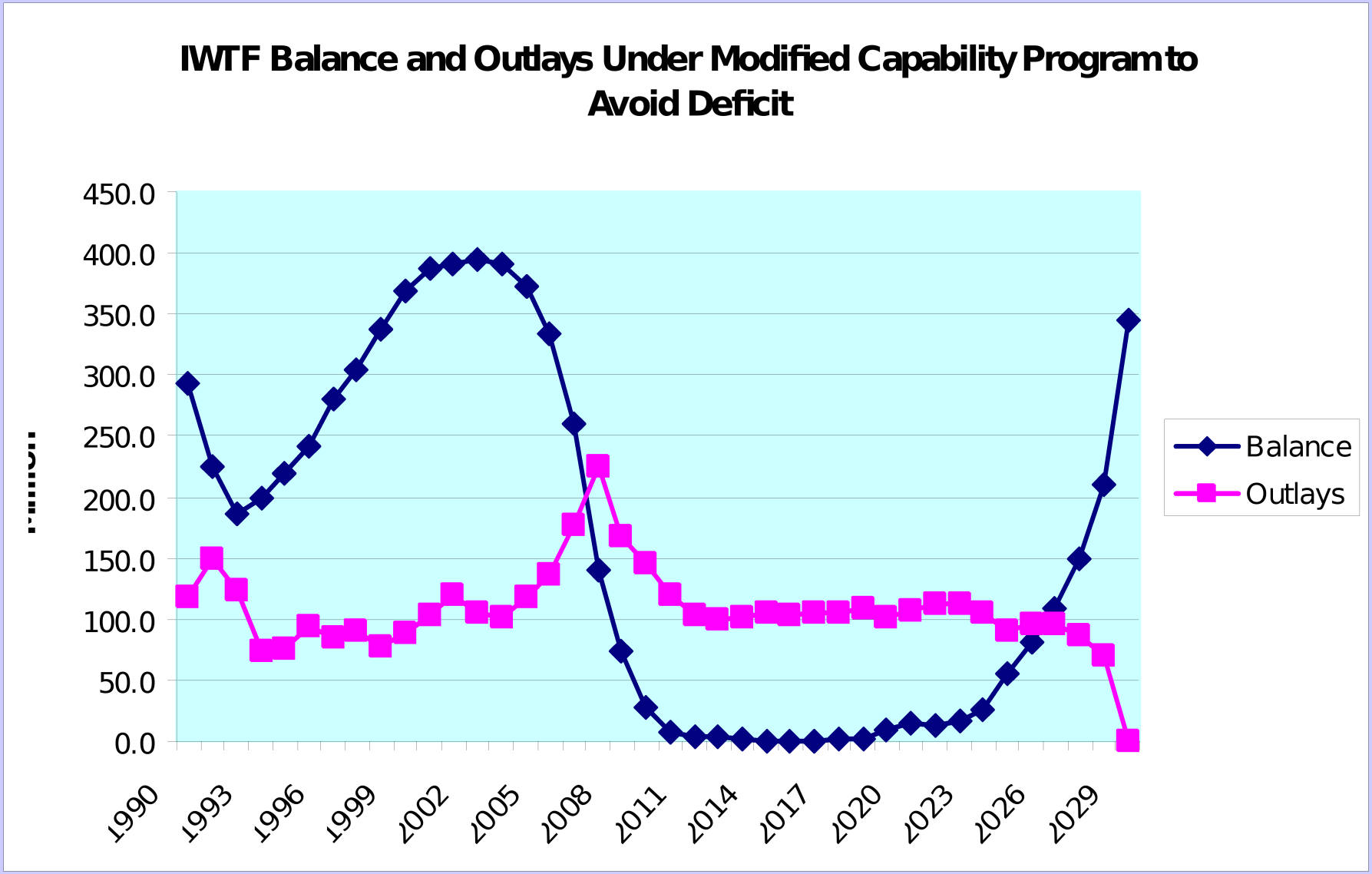
Economic Benefits Foregone from Construction Delays, FY 07 Budget




IWTF Balance and Outlays for Projects in 07 Budget with Baseline Funding
800.0
700.0
600.0
500.0
400.0
300.0
200.0
100.0
0.0
1990
1992
1994
1996
1998
2000
2002
2004
2006
2008
2010
2012
2014
2016
Balance
Outlays


IWTF Balance and Outlays for Ongoing Projects Only with Capability Funding
500.0
400.0
300.0
200.0
100.0
0.0
-100.0
-200.0
-300.0
-400.0
1990
1992
1994
1996
1998
2000
2002
2004
2006
2008
2010
2012
2014
2016
Balance
Outlays


IWTF Outlays and Balance Under 10-Year Capability Program
600.0
400.0
200.0
0.0
-200.0
-400.0
-600.0
-800.0
-1000.0
1990
1992
1994
1996
1998
2000
2002
2004
2006
2008
2010
2012
2014
2016
2018
2020
2022
Balance
Outlays


IWTF Balance and Outlays Under Modified Capability Program to Avoid Deficit
450.0
400.0
350.0
300.0
250.0
200.0
150.0
100.0
50.0
0.0
1990
1993
1996
1999
2002
2005
2008
2011
2014
2017
2020
2023
2026
2029
Balance
Outlays

justing Plan Formulation for a Constrained Budge
What's Ahead

Ohio River Mainstem Systems Study (ORMSS)

Draft System Investment Plan (SIP)

10 March 2006

Assessment of Nonstructurals

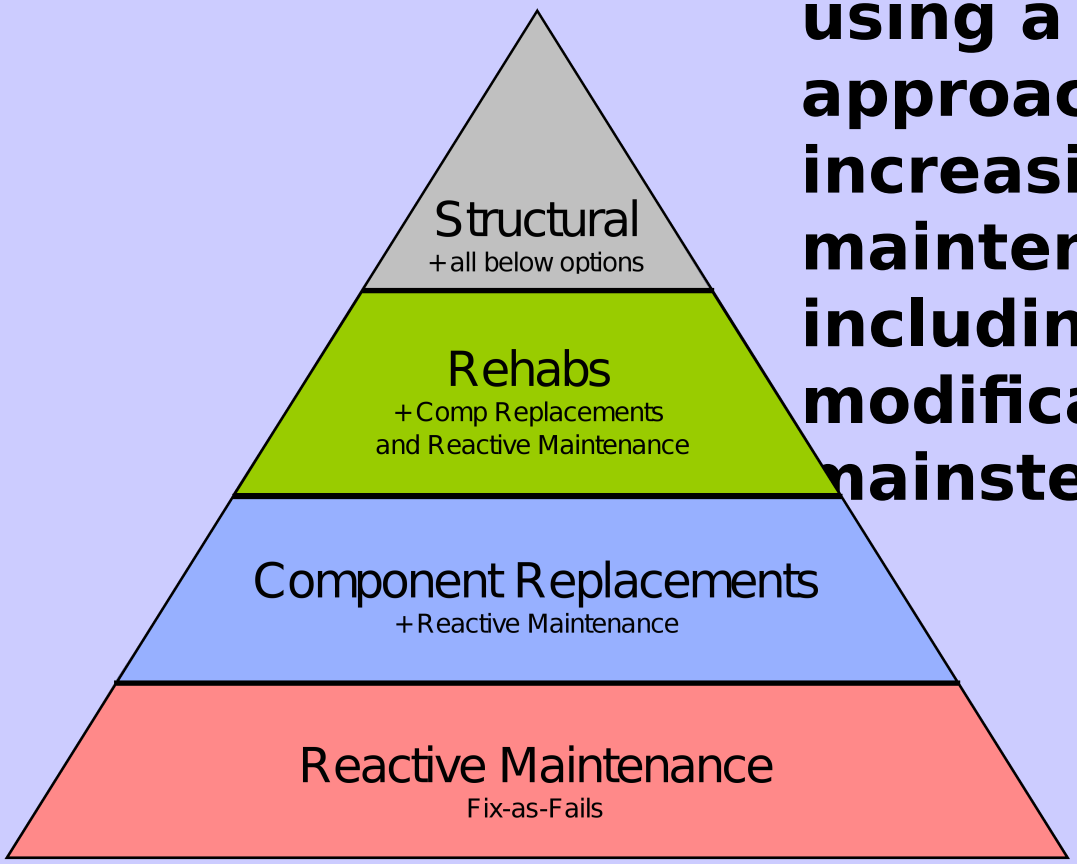
- **Evaluated**
  - **N-up, N-down operating policies**
  - **Mooring cells to reduce approach time**
  - **Helperboats**
  - **Industry re-scheduling**
- **Work to do – awaiting results of Navigation Economics Technologies (NETS) R&D**
  - **Congestion fees / Tradable lockage permits**
  - **Scheduling / Lock appointments**

Without Project Condition (WOPC)

"the WOPC was formulated to develop the least federal cost plan to provide viable navigation on the Ohio River mainstem"

- Assumes minimum level of system reliability maintained
- Includes authorized improvements either under construction or pending appropriation (Olmsted, J.T. Myers, Greenup, Marmet, McAlpine, Kentucky, Chickamauga, Lower Mon)
- Includes implementation of the Ohio River Mainstem Ecosystem Restoration Program
- Focus is on the mainstem locks, not the dams

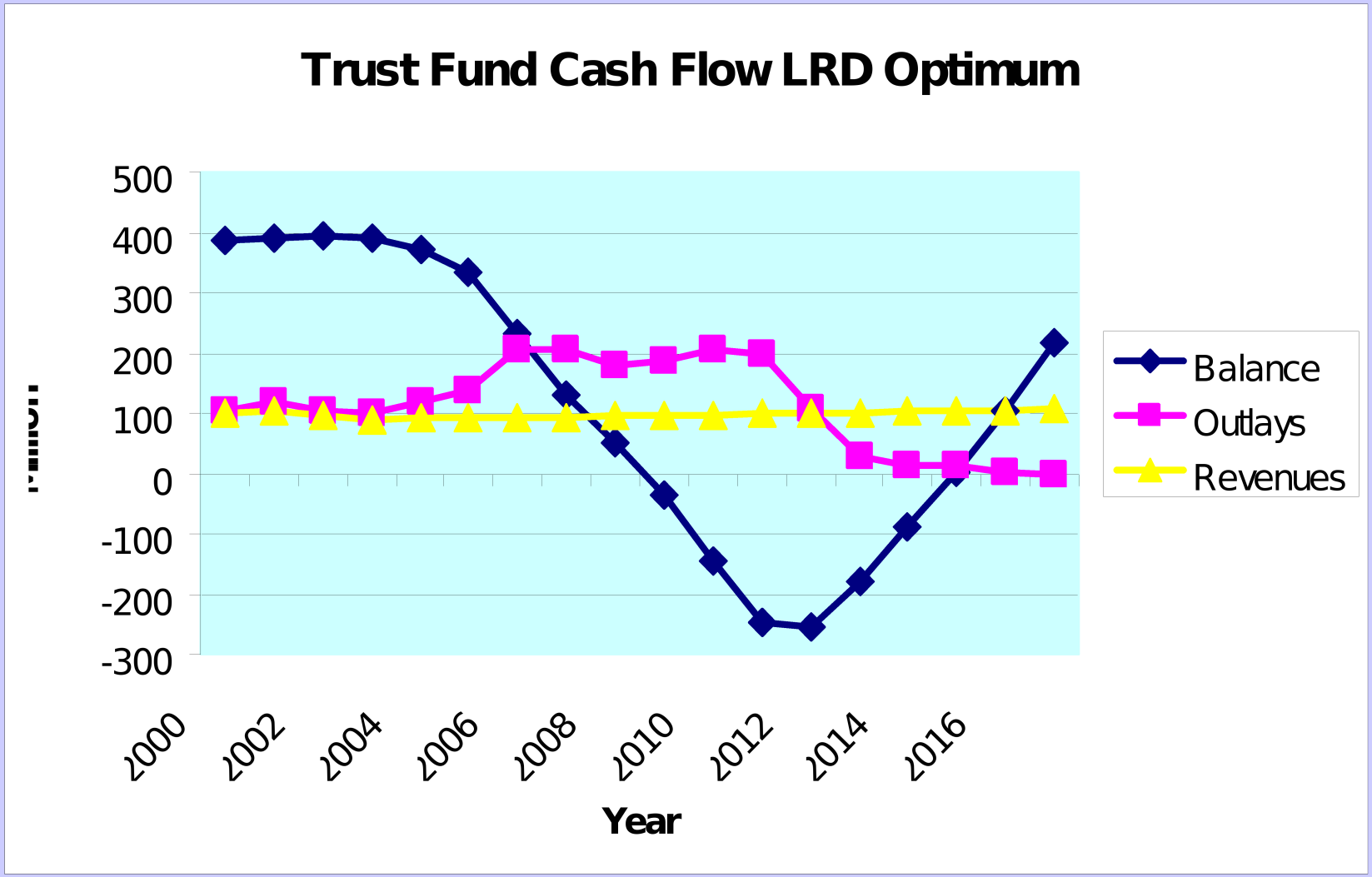
With Project Condition (WPC)



"the WPC was formulated using a stepwise approach optimizing increasingly more aggressive maintenance alternatives, including structural modifications, at each of the mainstem projects"

Draft Conclusions

- **All traffic scenarios show increases**
- The mainstem locks will degrade without proactive maintenance. Traffic disruptions will accelerate, economic consequences will likely be severe.
- Proactive maintenance robustly justified
- **Capacity expansion projects are justified at upper Ohio River locks.**
- Need to complete the Upper Ohio River study and initiate studies for several major lock rehabilitations
- **Long-term resource sustainability not adversely impacted by future navigation investments. Mussels and riparian/floodplain resources expected to remain marginally sustainable.**
- **High priority ecosystem sustainability measures are needed for the Ohio River and associated resources on a large scale.**
- **The SIP is not budget constrained. Need to develop a budget constrained and comprehensive Inland Navigation System SIP**


Trust Fund Cash Flow LRD Optimum
500
400
300
200
100
0
-100
-200
-300
2000
2002
2004
2006
2008
2010
2012
2014
2016
Year
Balance
Outlays
Revenues

Draft Recommendations

- Increase O&M funding
- Complete all authorized navigation improvements
- Initiate main chamber rehabilitation studies for Meldahl, Hannibal, and Myers
- Pursue planning and implementation of measures to improve environmental sustainability
- Initiate preparation of the Program Implementation Plan for the Ohio River Ecosystem Restoration Program.
- Provide optimal funding for the Upper Ohio River Study currently underway
- Complete work on the Markland gates as soon as possible
- Initiate a comprehensive system investment planning process for the Inland Navigation System

The Road Ahead

- Provide guidance on additional steps necessary prior to releasing the report to the public
- Continue the development of a budget constrained system investment plan
- Develop a comprehensive system investment planning process for the Ohio Riv
  Navigation System

Montgomery L&D, Upper Ohi

Navigation Planning in a Constrained Budget Environment

Summary

- **Nearly $10 billion in navigation construction projects underway – deep draft and inland waterways**
- **O&M and construction dollars squeezed**
- **Project partners and stakeholders have high expectations**
- **Inland Waterways Trust Fund will not support current program**
- **Corps needs to factor constrained budgets into the planning process**